Re-evaluation Note REV2010-13

Dazomet – Proposed Mitigation Measures

(publié aussi en français)

13 August 2010

This document is published by the Health Canada Pest Management Regulatory Agency. For further information, please contact:

Publications
Pest Management Regulatory Agency
Health Canada
2720 Riverside Drive
A.L. 6604-E2
Ottawa, Ontario
K1A 0K9

Internet: pmra.publications@hc-sc.gc.ca
healthcanada.gc.ca/pmra
Facsimile: 613-736-3758
Information Service:
1-800-267-6315 or 613-736-3799
pmra.infoserv@hc-sc.gc.ca

Canada

HC Pub: 100341

ISBN: 978-1-100-16250-8 (978-1-100-16251-5)
Catalogue number: H113-5/2010-13E (H113-5/2010-13E-PDF)

© Her Majesty the Queen in Right of Canada, represented by the Minister of Health Canada, 2010

All rights reserved. No part of this information (publication or product) may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, or stored in a retrieval system, without prior written permission of the Minister of Public Works and Government Services Canada, Ottawa, Ontario K1A 0S5.

Table of Contents

1.0 Background 1
2.0 Proposed Regulatory Strategy 1
3.0 Supporting Documentation 2
4.0 Next Steps 2
Appendix I List of products currently registered for Dazomet (discontinued products excluded) as of 31 January 2010 3
Appendix II Proposed Label amendments for products containing dazomet. 5
Table 1 Dazomet Buffer Zone Distances (meters) for soil fumigation by incorporated application (non-greenhouse use). 14
Table 2 Dazomet Buffer Zone Distances (metres) for all greenhouse applications. 15
Appendix III The Minimum Requirements for Fumigation Management Plan 27

1.0 Background

Dazomet is under re-evaluation by Health Canada's Pest Management Regulatory Agency (PMRA), and is one of the active ingredients included in the soil fumigant cluster. The purpose of this Re-evaluation Note is to notify registrants, pesticide regulatory officials, and the Canadian public of proposed label amendments for the products containing dazomet.

Common Name	Chemical Name		CAS Registry Number
	International Union of Pure and Applied Chemistry (IUPAC)	Chemistry Abstracts Service (CAS)	
Dazomet	Tetrahydro-3,5-dimethyl-1,3,5-thiadiazine-2-thione	Tetrahydro-3,5-dimethyl-2*H*-1,3,5-thiadiazine-2-thione	533-74-4

Dazomet is a non-selective pre-plant soil fumigant and antimicrobial agent. Upon application, dazomet is broken down into several degradates; the primary being methyl isothiocyanate (MITC). In Canada, dazomet is currently registered for use as a soil fumigant for control of nematodes, fungi and weed seeds in open land, nurseries and greenhouses. The end-use soil fumigant product is formulated as a granule and is applied using spreader equipment with incorporation into soil. Dazomet is also registered for use as an antimicrobial agent for control of microbial activity in pulp and paper, cooling towers, air washers and as a preservative in slurries, coatings, high viscosity suspensions, emulsions and adhesives. Appendix I lists all currently registered products in Canada for dazomet.

2.0 Proposed Regulatory Strategy

The PMRA is requiring registrants of products containing dazomet to implement mitigation measures to limit user exposure and to further protect bystanders and the environment. The implementation of these mitigation measures is considered to be a first step in the re-evaluation of the Canadian uses of the products containing dazomet.

The measures are consistent with measures adopted by the United States Environmental Protection Agency (USEPA) in their Re-registration Eligibility Decision (RED) documents (2008) and amended RED documents (2009) for dazomet, and the USEPA Fumigant Management Plans and Postapplication Summary Reports Fact Sheet (2010). These mitigation measures are also intended to increase consistency across all Canadian product labels. The PMRA is aware that the USEPA assessment of dazomet is ongoing, and may re-assess as required.

The proposed mitigation measures include the requirement for a site-specific Fumigation Management Plan prior to any fumigation with dazomet. The registrants are required to develop, in consultation with the PMRA, a product stewardship program for the soil fumigant uses of dazomet. A key component of the stewardship program is the development of a Fumigation Management Plan guidance document. It is proposed that this Fumigation Management Plan guidance document be part of an applicator's manual distributed with the product.

The present Re-evaluation Note addresses the proposed label amendments for the end-use products containing dazomet, as well as the Fumigation Management Plan requirements for the soil fumigant uses. Appendix II lists all required label amendments for products containing dazomet. Appendix III outlines the minimum requirements that must be included in the Fumigation Management Plan.

3.0 Supporting Documentation

PMRA documents are available through the Pest Management Information Service, phone: 1-800-267-6315 within Canada or 1-613-736-3799 outside Canada (long distance charges apply); fax 613-736-3798; e-mail pmra.infoserv@hc-sc.gc.ca.

The USEPA RED documents are available on the Office of Pesticide Programs' website at www.epa.gov/pesticides/reregistration.

4.0 Next Steps

The PMRA will accept written comments on this proposal up to 60 days from the date of publication of this document. Please forward all comments to Publications (please see contact information indicated on the cover page of this document). The PMRA will consider all comments received from the public in response to this consultation document, and will then publish a follow-up document which will include implementation details.

Appendix I List of products currently registered for Dazomet (discontinued products excluded) as of 31 January 2010.

Registration Number	Marketing Class	Registrant	Product Name	Formulation Type	Registered Use Type	Guarantee
18873	Technical	Verichem, Inc.	N-521 Biocide	solid	-	97%
19413	Technical	Mitsui & Co. (Canada) Ltd.	Technical DAZOMET (BASAMID Granular)	granules	-	97%
23295	Technical	Kemira Chemicals, Inc.	AMA 35 D-C	particulate	-	97%
25256	Technical	Buckman Laboratories of Canada, Ltd.	THION Microbicide	granules	-	98%
19719	Manufacturing Concentrate	BASF Canada, Inc.	MYACIDE DZ	granules	-	97%
14645	Commercial	Nalco Canada Company	NALCON D3T-A	solution	Antimicrobial	21%
14647	Commercial	Nalco Canada Company	NALCON 7616	wettable powder	Antimicrobial	97%
15032	Commercial	Mitsui & Co. (Canada) Ltd.	BASAMID Granular Soil Fumigant	granules	Soil fumigant	97%
23954	Commercial	Kemira Chemicals, Inc.	AMA-35D-PC Materials Preservatives	suspension	antimicrobial	97%
24065	Commercial	Kemira Chemicals, Inc.	AMA-20-C	suspension	antimicrobial	20%
24065.01	Commercial	Johnson Diversey Canada, Inc.	X-CELL 425LC	suspension	antimicrobial	20%
24573	Commercial	ISP Canada Corp.	NUOSEPT S Preservative	suspension	antimicrobial	97%
24574	Commercial	ISP Canada Corp.	NUOSEPT® 120 Perservative	suspension	antimicrobial	20%
24755	Commercial	Verichem, Inc.	N-521® PAC-24	solution	antimicrobial	24%
26404	Commercial	Buckman Laboratories of Canada, Ltd.	BUSAN 1058 Liquid Microbicide	emulsifiable concentrate	antimicrobial	24%
27138	Commercial	Buckman Laboratories of Canada, Ltd.	BUSAN 1124 Microbicide	emulsifiable concentrate	antimicrobial	24%
27166	Commercial	Buckman Laboratories of Canada, Ltd.	BUSAN 1059 WS	wettable powder	antimicrobial	98%
27171	Commercial	Verichem, Inc.	N-521 Dispersion	suspension	antimicrobial	19.4%

Registration Number	Marketing Class	Registrant	Product Name	Formulation Type	Registered Use Type	Guarantee
27830	Commercial	Johnson Diversey Canada, Inc.	B.I.O. Blast 100S	suspension	antimicrobial	97%
27875	Commercial	Hercules Canada, Inc.	SPECTRUM RX3500	suspension	antimicrobial	19.8%

Appendix II Proposed Label amendments for products containing dazomet.

All end-use products containing dazomet for soil fumigant uses must be classified as Restricted Class Products. The label amendments presented below do not include all label requirements for individual end-use products, such as first aid statements, disposal statements, precautionary statements and supplementary protective equipment. Additional information on labels of currently registered products that contradicts the amendments noted below should be removed from the labels.

The labels of products in Canada containing dazomet must be amended to include the following statements to further protect workers, bystanders and the environment.

Commercial Class Products

1. Restricted classification

The following statements must be included on the primary display panel of the labels registered for soil fumigant uses:

> **RESTRICTED PRODUCT**
>
> **READ THE ENTIRE LABEL AND GUIDANCE FOR PREPARATION OF A FUMIGATION MANAGEMENT PLAN BEFORE USING**
>
> **THIS PRODUCT CAN ONLY BE USED IN CONJUNCTION WITH A DETAILED FUMIGATION MANAGEMENT PLAN**

The following statements must be included in the NATURE OF RESTRICTION section of the labels registered for soil fumigant uses:

> This product is only to be used by individuals holding an appropriate pesticide applicator certificate or license recognized by the provincial/territorial pesticide regulatory agency where the pesticide application is to occur.
>
> This product is accompanied by an approved label and Guidance for Preparation of a Fumigation Management Plan. READ AND UNDERSTAND THE ENTIRE LABELLING.

2. Fumigation Management Plan

The following statements must be included on labels registered for soil fumigant uses in a section entitled FUMIGATION MANAGEMENT PLAN:

A Fumigation Management Plan is an organized, written description of the required steps involved to help ensure a safe, legal and effective fumigation.

The supervising fumigant handler is responsible for working with the owners and/or responsible employees of the site to be fumigated to develop and follow a Fumigation Management Plan. All plans should reflect the experience and expertise of the applicator and circumstances at and around the site and/or area.

In addition to the plan, the applicator must read the entire label and the Applicator's Manual, and follow its directions carefully. If the applicator has any questions about the development of a Fumigation Management Plan, contact the supplier for further assistance.

The Fumigation Management Plan and related documentation, including monitoring records, must be maintained for a minimum of 2 years.

Before any fumigation begins, handlers must be familiar with and comply with all local/provincial/territorial/federal laws and regulations.

3. Rate Reduction

The maximum application rate for dazomet soil fumigation for open land uses must be reduced to 476 kg of active ingredient per hectare.

The maximum application rate for dazomet fumigation in greenhouses must be reduced to 297 kg of active ingredient per hectare.

4. Application Restrictions

Add to the primary display panel of all end-use product labels with soil fumigant uses:

The maximum area that can be treated in greenhouses is 4500 m^2.

Application with handheld equipment is prohibited.

5. Label amendments pertaining to basic hygiene for all end-use products

Add to PRECAUTIONS:

Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

Remove clothing immediately if pesticide comes in contact with skin through soaked clothing or spills. Then wash skin thoroughly and put on clean clothing. Wash contaminated clothing separately from other clothes before reuse.
Store personal protective equipment out of reach of children and pets.

Avoid touching 'clean' surfaces while wearing personal protective equipment (for example: steering wheel, door handles, counter tops), or thoroughly clean these surfaces afterwards with water and detergent.

Remove personal protective equipment immediately after handling this product. Remove personal protective equipment in a pre-determined area separate from living or working areas.

Wash the outside of the gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Avoid touching eyes and face until you have washed your hands.

Never use the mouth to siphon product from containers or to blow out clogged lines, nozzles, etc.

Respirators should be stored in a sealed plastic bag until the next use, to preserve the life of the filter. Regularly change the respirator filters.

Repair/replace torn or broken personal protective equipment.

Treat all clothing worn during pesticide use as contaminated, and handle with chemical resistant gloves.

Use hot water, heavy-duty liquid detergent, at the highest water level setting, and the longest wash cycle. Keep and wash personal protective equipment separately from other laundry.

If heavily soiled, wash personal protective equipment two or three times. After washing, run the washing machine through a complete cycle with detergent. If possible, line-dry the clothing.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

6. Label amendments and user safety requirements to further protect workers and bystanders

Add to PRECAUTIONS:

For the antimicrobial products:

For the use in pulp and paper:

Wear long sleeve coveralls over long pants and a long-sleeved shirt, shoes plus socks, chemical-resistant gloves, and goggles or a face shield during mixing, loading, application and all other handling activities.

For all other antimicrobial uses:

Wear long pants and a long-sleeved shirt, shoes plus socks, chemical-resistant gloves, and goggles or a face shield during mixing, loading, application and all other handling activities.

For the soil fumigant products:

Persons engaged in any of the following activities are defined as fumigant handlers:

- persons participating in the application as supervisors, loaders, drivers, tractor co-pilots, shovelers, cross ditchers, or as other direct application participants (application starts when the fumigant is first introduced into the soil and ends after the fumigant has stopped being delivered/dispensed/injected to the soil);
- persons using devices taking air samples to monitor fumigant air concentrations;
- persons cleaning up fumigant spills (this does not include emergency personnel not associated with the fumigation application);
- persons handling or disposing of fumigant containers;
- persons cleaning, handling, adjusting, or repairing the parts of fumigation equipment that may contain fumigant residues;
- persons installing, repairing, operating equipment in the fumigant application block or surrounding buffer zone during the re-entry interval;
- persons entering the application site or surrounding buffer zone during the re-entry interval to perform scouting, crop advising, or monitoring tasks; and,

- persons installing, perforating (cutting, punching, slicing, poking), removing, repairing, or monitoring tarps. NOTE: see the *Tarp Perforation and/or Removal Section* on this label for requirements about when tarps are allowed to be perforated and removed.
- persons outside the perimeter of the buffer zone who monitor fumigant air concentrations.

All fumigant handlers must wear appropriate personal protective equipment in accordance with the provincial/territorial pesticide regulatory agency where the pesticide application is to occur; including at minimum:

- long sleeve coveralls over a short-sleeved shirt and short pants when in the treated application block,
- chemical-resistant gloves when handling the product, and
- boots plus socks.

Eye and Lung Protection

- All handlers are required to wear protective eyewear.
- When respiratory protection is required, in lieu of protective eyewear, handlers must wear at least a NIOSH-approved full-face, or helmet/hood style respirator with either:
  - an organic-vapor-removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH approval number prefix TC-23C), or
  - a respirator with a canister approved for pesticides (MSHA/NIOSH approval number prefix TC-14G).

Respirators must fit properly. Any obstruction to a proper fit should be removed (for example, beard, long sideburns).

Respirator Availability

The supervising fumigant handler must confirm and document in the Fumigation Management Plan that an air-purifying respirator and appropriate cartridges of the type specified in the personal protective equipment section of this labeling are immediately available for each handler who will wear one.

At least one handler must have the appropriate respirator and cartridges available.

Providing, cleaning and maintaining personal protective equipment

The supervising fumigant handler must ensure that all handlers *in the application block and the surrounding buffer zone* are provided with and correctly wear the required personal protective equipment. The personal protective equipment must be cleaned and maintained.

Respiratory Protection and Stop Work Triggers

The following procedures must be followed to determine whether respiratory protection is required, or if operations must cease, for any person performing a fumigant handling task as defined on this label.

- If at any time any handler experiences sensory irritation (tearing, burning of the eyes or nose) when not wearing a respirator then either:
  - an air-purifying respirator must be worn by all handlers who remain in the application block and surrounding buffer zone, and air monitoring samples must be collected at least every 2 hours in the breathing zone of a handler performing a representative handling task; or
  - operations must cease and handlers not wearing respiratory protection must leave the application block and surrounding buffer zone.

- Handlers can remove respirators or resume operations provided:
  - two consecutive breathing-zone samples taken at the handling site at least 15 minutes apart show that levels of methyl isothiocyanate (MITC) have decreased to less than 600 ppb at the location where the irritation was first experienced; and
  - handlers do not experience sensory irritation.
  - IMPORTANT: See requirements in the *Fumigant Air Monitoring* section.

- If at any time any handler experiences any sensory irritation when wearing a respirator or an air sample is greater than or equal to 6000 ppb:
  - all handler activities must cease and handlers must be removed from the application block and surrounding buffer zone; and
  - the emergency plan detailed in the Fumigation Management Plan must be implemented.

- Handlers can resume work activities **with** appropriate respiratory protection provided all of the following conditions are met:
  - two consecutive breathing zone samples for MITC taken at least 15 minutes apart must be less than 6000 ppb at the location where the irritation was first experienced;
  - handlers do not experience sensory irritation while wearing the air purifying respirator;
  - respirator cartridges have been changed; and
  - air monitoring samples must be collected at least every 2 hours in the breathing zone of a handler performing a representative handling task.
  - IMPORTANT: See requirements in the *Fumigant Air Monitoring* section.

- Handlers can resume work activities **without** respiratory protection provided all of the following conditions are met:
  - two consecutive breathing zone samples taken at the handling site at least 15 minutes apart show levels of MITC have decreased to less than 600 ppb, at the location where the irritation was first experienced; and
  - handlers do not experience sensory irritation.
  - IMPORTANT: See requirements in the *Fumigant Air Monitoring* section.

Fumigant Air Monitoring

- When using monitoring devices to monitor air concentration levels, a direct reading detection device, such as a Draeger or Sensidyne device must be used. The devices must have a sensitivity of at least 600 ppb for MITC.
- During the collection of air samples an air-purifying respirator must be worn by the handler taking the air samples.

Exclusion of Non Handlers from Application Block and Buffer Zone

The supervising fumigant handler and/or the owner/operator of the establishment where the fumigation is taking place must make sure that all persons who are not trained and not wearing personal protective equipment (PPE) and who are not performing one of the handling tasks defined on this label are:

- excluded from application block during the entry prohibition period, and
- excluded from the buffer zone during the re-entry interval.

7. Label amendments pertaining to application methods

Add to DIRECTIONS FOR USE of all the soil fumigant products:

Tarp Perforation and/or Removal
IMPORTANT: Persons perforating, repairing, removing, and/or monitoring tarps are defined, within certain time limitations, as fumigant handlers (see fumigant handlers as stated in this labeling) and must be provided the PPE and other protections for handlers as required on this label.

Tarps must not be perforated until a minimum of 5 days (120 hours) have elapsed after the fumigant application is complete (including laying tarps), unless a weather condition exists which necessitates the need for early perforation or removal. See the *Early Tarp Removal for Broadcast Applications* and *Early Tarp Perforation for Flood Prevention Activities* sections.

If tarps will be removed before planting, tarp removal must not begin until at least 2 hours after tarp perforation is complete.

If tarps will not be removed before planting, planting or transplanting must not begin until at least 48 hours after the tarp perforation is complete.

If tarps are left intact for a minimum of 14 days after fumigant injection into the soil is complete, planting or transplanting may take place while the tarps are being perforated.

Each tarp panel must be perforated.

Tarps used for fumigations may be perforated manually ONLY for the following situations:

- At the beginning of each row when a coulter blade (or other device which performs similarly) is used on a motorized vehicle such as an ATV.
- In fields that are 0.4 hectares (1 acre) or less.
- During flood prevention activities.

In all other instances tarps must be perforated (cut, punched, poked, or sliced) only by mechanical methods.

Tarp perforation for broadcast fumigations must be completed before noon.

For broadcast fumigations tarps must not be perforated if rainfall is expected within 12 hours.

Early Tarp Removal for Broadcast Applications

- Tarps may be removed before the required 5 days (120 hours) if adverse weather conditions have compromised the integrity of the tarp, provided that the compromised tarp poses a safety hazard. *Adverse weather* includes high wind, hail, or storms that may blow tarps off the field and create a hazard, for example, tarps blowing into power lines and onto roads. A *compromised tarp* is a tarp that due to an adverse weather condition is no longer performing its intended function and is creating a hazard.
- If tarps are removed before the required 5 days have elapsed due to adverse weather, the events must be documented in the post-application summary report section of the Fumigation Management Plan.

Early Tarp Perforation for Flood Prevention Activities

- Tarp perforation is allowed before the 5 days (120 hours) have elapsed if rain necessitates field drainage.
- Tarps must be immediately retucked and packed after soil removal.

Entry Restricted Period

Entry (including early entry) by any person – other than a correctly trained and PPE-equipped handler who is performing a handling task listed on this labeling – is PROHIBITED - from the start of the application until:

- 5 days (120 hours) after the application is complete for untarped applications, or
- 5 days (120 hours) after the application is complete if tarps are not perforated and removed for at least 14 days following application, or
- 48 hours after tarps perforation is complete if they will not be removed for at least 14 days following application, or
- until tarp removal is completed if tarps are both perforated and removed less than 14 days after application.

NOTE: see the *Tarp Perforation and Removal* section on this labeling for requirements about when tarps are allowed to be perforated.

8. Label amendments pertaining to buffer zone requirements for the soil fumigant products

The DIRECTIONS FOR USE section of the soil fumigant product labels must include buffer zone tables. The buffer zone tables, based on the following tables, must only reference registered uses, application rates and application method specific to each product label.

Table 1 **Dazomet Buffer Zone Distances (meters) for soil fumigation by incorporated application (non-greenhouse use).**

Application Rate (incorporation) (kg a.i./ha)	Block Size (hectares)											
	16	12	8	6	4	3.5	3	2.5	2	1.5	1	≤0.5
475	275	200	150	120	85	80	70	55	50	45	45	35
450	225	175	125	105	75	70	65	50	45	40	35	25
435	225	175	125	100	75	70	60	50	45	40	35	20
425	225	175	125	100	70	65	60	50	45	40	35	20
415	225	175	125	95	70	65	60	50	45	35	30	20
405	200	175	125	90	65	60	55	50	40	35	30	20
390	200	150	125	90	65	60	55	45	40	35	30	20
380	200	150	100	85	65	60	55	45	40	35	30	15
370	200	150	100	85	60	55	50	45	40	35	30	15
360	175	150	100	80	60	55	50	40	40	30	25	15
345	175	150	95	75	55	55	50	40	35	30	25	15
335	175	125	95	75	55	50	45	40	35	30	25	15
325	175	125	90	70	50	50	45	35	35	30	25	15
315	150	125	85	65	50	45	45	35	35	25	20	10
305	150	125	80	65	50	45	40	35	30	25	20	10
295	150	125	75	60	45	45	40	35	30	25	20	10
290	150	100	75	60	45	40	35	30	25	20	15	10
280	150	100	70	55	40	35	35	25	25	20	15	10
270	150	100	70	50	35	35	30	25	20	15	15	10
260	125	100	65	50	35	30	25	20	15	15	10	10
245	125	95	60	45	30	25	25	15	15	10	10	10
235	125	90	60	40	25	25	20	15	10	10	10	10
225	125	85	55	40	25	20	15	10	10	10	10	10
215	100	80	55	40	25	20	15	10	10	10	10	10
200	100	80	50	35	20	20	15	10	10	10	10	10
190	100	75	50	35	20	20	15	10	10	10	10	10
180	90	70	45	35	20	20	15	10	10	10	10	10
170	85	65	45	30	20	15	15	10	10	10	10	10
155	80	60	40	30	20	15	15	10	10	10	10	10
150	75	55	40	30	20	15	15	10	10	10	10	10
145	75	55	40	30	20	15	10	10	10	10	10	10
135	65	50	35	25	15	15	10	10	10	10	10	10
125	55	45	30	20	15	10	10	10	10	10	10	10
110	45	35	25	20	15	10	10	10	10	10	10	10
100	35	30	20	15	10	10	10	10	10	10	10	10
90	25	20	15	15	10	10	10	10	10	10	10	10
80	20	15	10	10	10	10	10	10	10	10	10	10
75	10	10	10	10	10	10	10	10	10	10	10	10

Table 2 Dazomet Buffer Zone Distances (metres) for all greenhouse applications.

Application Rate (kg a.i./ha)	Structure size (m^2)								
	500	**1000**	**1500**	**2000**	**2500**	**3000**	**3500**	**4000**	**4500**
295	75	100	125	175	200	225	250	275	350
225	55	90	100	125	175	175	225	225	250
150	35	65	80	100	125	125	175	175	200
75	15	25	35	50	65	75	90	100	100

Add to DIRECTIONS FOR USE:

Buffer Zones

A "buffer zone" must be established for every fumigant application. The following describes the general buffer zone requirements:

- "Buffer zone" is an area established around the perimeter of each application block or greenhouse where a soil fumigant is applied. The buffer zone must extend from the edge of the application block or greenhouse perimeter equally in all directions.
- All non-handlers including field workers, nearby residents, pedestrians, and other bystanders, must be excluded from the buffer zone during the re-entry interval except for transit (see the *Exemptions for Transit Through Buffer Zones* section).
- The "re-entry interval" starts at the moment when any fumigant is delivered/dispensed to the soil within the application block and lasts for a minimum of 48 hours after the fumigant has stopped being delivered/dispensed to the soil.
- An "application block" is a field or portion of a field treated with a fumigant in any 24-hour period (figure 1, figure 2). See exception provided in the "Buffer Zone Proximity" section.

Buffer Zone Proximity

Before the application begins, the supervising fumigant handler must determine whether the application block or its resulting buffer will overlap with a buffer that is already in effect.

To reduce the potential for off-site movement from multiple fumigated fields, buffer zones from multiple dazomet application blocks may not overlap **UNLESS**:

- A minimum of 12 hours have elapsed from the time the earlier application(s) for which a buffer is in place end(s) until the latter application begins, and

- Emergency preparedness and response measures specified in the Fumigation Management Plan have been implemented if there are any homes, businesses, or property not within the control of the owner/operator within 90 meters of each buffer zone.

Authorized Entry to Buffer Zones
Only authorized handlers may be in the buffer zone during the re-entry interval. All non-handlers including field workers, nearby residents, pedestrians, and other bystanders, must be excluded from the buffer zone during the re-entry interval except for certain persons in transit (see the *Exemptions for Transit Through Buffer Zones* section).

Exemptions for Transit Through Buffer Zones
Vehicular and bicycle traffic on public and private roadways through the buffer zone is permitted. "Roadway" means that portion of a street or highway improved, designed or ordinarily used for vehicular travel, exclusive of the sidewalk or shoulder even if such sidewalk or shoulder is used by persons riding bicycles. In the event a highway includes two or more separated roadways, the term "roadway" shall refer to any such roadway separately.

Bus stops or other locations where persons wait for public transit are not permitted within the buffer zone. See the *Posting Requirements* section for additional requirements that may apply.

Structures Under the Control of Owner/Operator of the Application Block
Buffer zones may not include buildings used for storage such as sheds, barns, garages, etc., **UNLESS,**
1. The storage buildings are not occupied during the re-entry interval, and
2. The storage buildings do not share a common wall with an occupied structure.

- See the *Posting Requirements* section for additional requirements that may apply.

Areas Not Under the Control of Owner/Operator of the Application Block

Buffer zones may not include residential areas (including employee housing, private property, buildings, commercial, industrial, and other areas that people may occupy or outdoor residential areas, such as lawns, gardens, or play areas) **UNLESS,**

1. The occupants provide written agreement to the supervising fumigant handler and/or the owner/operator that they will voluntarily vacate the buffer zone during the entire re-entry interval, and
2. Re-entry by occupants and other non-handlers must not occur until,
   - The re-entry interval has ended; and
   - Sensory irritation is not experienced.

Buffer zones may not include agricultural areas owned/operated by persons other than the owner/operator of the application block, **UNLESS,**

1. The owner/operator of the application block can ensure that the buffer zone will not overlap with a buffer zone from any adjacent property owners, except as provided for above, and
2. The owner/operator of the adjacent areas (areas that are not under the control of the owner/operator of the application block) provides written agreement to the supervising fumigant handler that they, their employees, and other persons will stay out of the buffer zone during the entire re-entry interval.

Buffer zones must not include roads and rights of way **UNLESS,**

1. The area is not occupied during the re-entry interval, and
2. Entry by non-handlers is prohibited during the re-entry interval.

For all other publicly owned and/or operated areas such as parks, side walks, walking paths, playgrounds, and athletic fields, buffer zones must not include these areas **UNLESS,**

1. The area is not occupied during the re-entry interval,
2. Entry by non-handlers is prohibited during the re-entry interval, and

Written permission to include the public area in the buffer zone is granted to the supervising fumigant handler and/or the owner/operator by the appropriate local/provincial/territorial/federal authorities responsible for management and operation of the area.

- See the *Posting Requirements* section for additional restrictions that may apply.

- It is the responsibility of the supervising fumigant handler to record all communications pertaining to areas not under control of the owner/operator in the Fumigation Management Plan.

Difficult to Evacuate Sites

Difficult-to-evacuate sites include schools (preschool to grade 12), provincial licensed daycare centers, nursing homes, assisted living facilities, hospitals, in-patient clinics, and prisons.

- No fumigant application with a buffer zone greater than 90 metres is permitted within 400 metres of the sites listed above unless the site is not occupied during the application and the 36-hour period following the start of application.
- No fumigant application with a buffer zone of 90 metres or less is permitted within 200 metres of the sites listed above unless the site is not occupied during the application and the 36-hour period following the start of application

Buffer Zone Distances

Buffer zone distances must be calculated using the application rate and the size of the application block.

Figure 1. Broadcast Application

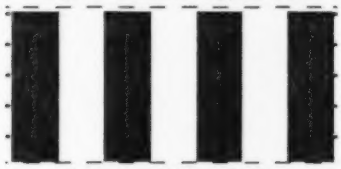

Figure 2. Bedded Application

In **Figures 1 and 2,** the dashed line represents the perimeter of the field, the shaded area is the portion of the field that is treated, and the un-shaded area is the area of the field that is untreated. Assuming both fields are 1 hectare, and only 50% of field in figure 2 is fumigated, the *labeled rate per treated acre* is 200 kg of dazomet per hectare for both Figure 1 and 2. The *broadcast rate* for figure 1 is 200 kg of dazomet per hectare but the *effective broadcast equivalent rate* for figure 2 is 100 kg of dazomet per hectare. The minimum buffer zone distances must be based on the broadcast or effective broadcast equivalent rates.

Note to registrant: Labels may express rates as kg per treated hectare under the application instructions but they must identify buffer zone distances based on the broadcast or effective broadcast equivalent rates.

Ten (10) meters is the minimum buffer distance regardless of site-specific application parameters.

If the buffer zone distance, after applying all applicable buffer zone credits, is greater than 0.8 km (800 meters) then the application is prohibited.

For all dazomet soil applications, the buffer zone tables must be used to determine the minimum buffer zone distances. Round-up to the nearest rate and block size, where applicable.

Buffer Zone Credits

The buffer zone distances for dazomet applications may be reduced by the percentages listed below. Credits may be added to a maximum of 40%. IMPORTANT: the minimum buffer zone distance is 10 meters regardless of buffer zone credits available.

- 10% reduction in buffer zone distance, IF the organic content of the soil in the application block is >1% - 2%; a 20% reduction in buffer zone distance, IF the organic content of the soil in the application block is >2% - 3%; and a 30% reduction in the buffer zone distance, IF the organic content of the soil in the application block is >3%. No credit will be given for soils with less than 1% organic matter. Record the measurements taken to verify the organic content in the Fumigation Management Plan.
- 10% reduction in buffer zone distance, IF the clay content of the soil in the application block is greater than 27%. Record the measurements taken to verify the clay content in the Fumigation Management Plan.
- There is no tarp credit for dazomet.

Example of buffer calculation if a credit is applicable

For example, if the buffer zone is 15 meters and the application qualifies for a buffer zone reduction credit since the soil organic content is 1.5%, then the buffer zone can be reduced by 10%, i.e., reduced by 1.5 meters based on the following calculation: 15 meters – (15 meters x 10%) = 13.5 meters"

9. **Label amendments pertaining to Good Agricultural Practice requirements for the soil fumigant products**

Add to DIRECTIONS FOR USE:

The following Good Agricultural Practices must be followed during all fumigant applications. All measurements and other documentation planned to ensure that the mandatory Good Agricultural Practices are achieved must be recorded in the Fumigation Management Plan.

Weather Conditions

- Prior to fumigation the weather forecast for the day of the application and the 48-hour period following the fumigation must be checked to determine if unfavorable weather conditions (see *Identifying Unfavorable Weather Conditions*) exist or are predicted and whether fumigation should proceed.
- Wind speed at the application site must be a minimum of 3 km/h at the start of the application or forecasted to reach at least 8 km/h during the application.
- Do not apply if a shallow, compressed (low-level) temperature inversion is forecast to persist for more than 18 consecutive hours for the 48-hour period after the start of application, or if there is an air-stagnation advisory in effect for the area in which the fumigation is planned.

Identifying Unfavorable Weather Conditions

- Unfavorable weather conditions block upward movement of air trapping fumigant vapors near the ground. The resulting air mass can move off-site in unpredictable directions and cause injury to humans, animals or property. These conditions often exist prior to sunset and continue past sunrise and persist as late as noontime. Unfavorable conditions are common on nights with limited cloud cover and light to no wind and their presence can be indicated by ground fog or smog and can also be identified by smoke from a ground source that flattens out below a ceiling layer and moves laterally in a concentrated cloud.

Soil Preparation

- The soil shall be in good tilth and free of large clods at the surface. If subsurface soil compaction layers (hardpans) are present within the intended fumigation treatment zone, a deep tillage to fracture these layers must occur prior to the soil fumigant.

- The area intended for treatment should be in seedbed condition. Do not apply this product to dry or improperly tilled soil. Repeated cultivation before treating will improve control of perennial weeds. Ditching around the site will prevent weed seeds, nematodes, and fungi from washing into the treated area and contaminating it.
- Field residue and stubble must be worked into the soil with little or no crop residue present on the soil surface. Crop residue that is present must not interfere with the soil seal. Removing the crop residue prior to fumigation is important to limit the natural "chimneys" that will occur in the soil when crop residue is present. These "chimneys" allow the soil fumigants to move through the soil quickly and escape into the atmosphere. This may create potentially harmful conditions for workers and bystanders and will limit the efficacy of the fumigant. However crop residue on the field serves to prevent soil erosion from both wind and water and is an important consideration. To accommodate erosion control, fumigant efficacy, and human health protection, clear fields of crop residue as close to the timing of the fumigation as possible to limit the length of time that the soil would be exposed to potentially erosive weather conditions.

Soil Temperature

- The maximum soil temperature measured at a 10 cm soil depth is 32 °C at the beginning of the application. If air temperatures have been above 37°C for more than three hours in any of the three days prior to application, then soil temperature shall be measured and recorded in the Fumigation Management Plan.

Soil Moisture

- For optimal effect, the soil to be fumigated must have sufficient moisture for good plant growth (at least 50% field capacity) for 5-14 days (depending on temperature) before the treatment.
- The soil must be moist 20 cm below the surface. Soil moisture must be determined by one of the following methods:
    - The United States Department of Agriculture (USDA) Feel and Appearance Method for testing. Surface soil generally dries rapidly and must not be considered in this determination. Please refer to the following document for instructions: http://nmp.tamu.edu/content/tools/estimatingsoilmoisture.pdf.
    - An instrument, such as a tensiometer.

- After application, the soil must be kept uniformly moist for 5-7 days. As soon as possible after incorporation, the soil should be sealed to retain the concentration of gases in the soil which can be achieved by:
  - Compacting the soil surface after incorporation with a roller attached behind the compacting implement.
  - Moistening the surface after incorporation so a crust forms.
  - Lightly moistening the soil on the third and fourth days after treatment in case the weather dries out the soil surface to avoid surface cracks.
  - In difficult situations best results may be obtained by tarping the treated area.

10. Additional label amendments for the soil fumigant products

Add to DIRECTIONS FOR USE:

Posting Requirements

The applicator must verbally warn workers and placard or post bilingual warning signs on all entrances to the fumigated area and/or the application block (i.e., the greenhouse or field or portion of a field treated with a fumigant in any 24-hour period). These signs must be posted at eye level and must be visible from all visible points of entry to the treated area. They must remain posted during application and throughout the restricted re-entry interval.

All warning signs must conform to the following requirements:

- The printed side of the sign must face away from the treated area toward areas from which people can approach.
- Signs must be clearly legible during entire posting period. The sign shall be at least 35 cm by 25 cm in size and the letters shall be at least 7 cm in height unless a smaller-sized sign is necessary because the treated area is too small to accommodate a sign of this size.
- Signs must be posted before the application begins and remain posted until the re-entry interval has expired.
- Signs must be removed within 3 days after the end of the re-entry interval.
- Registrants must provide generic warning signs which meet the criteria above at points of sale for applicators to use.
- Only a supervising fumigant handler (or someone under his/her supervision) may remove warning signs.

Warning signs for the **buffer zone** must:

- Be placed at all usual points of entry and along likely routes of approach from areas where people not under the land operator's control may approach the buffer zone.
  - Some examples of points of entry include, but are not limited to, roadways, sidewalks, paths, and bike trails.
  - Some examples of likely routes of approach are the area between a buffer zone and a roadway, or the area between a buffer zone and a housing development.
  - Posting of warning signs for the fumigation **buffer zone** is required, **unless** there is a physical barrier that prevents bystander access into the buffer zone.
  - Exception: If multiple contiguous blocks are fumigated within a 14-day period, the entire periphery of the contiguous blocks' buffer zones may be posted. The signs must remain posted until the last re-entry interval expires and signs may remain posted until 3 days after the re-entry interval for the last block has expired.

The warning signs for the **buffer zone** must bear the following:

- Do not walk sign
- "DO NOT ENTER"
- "Dazomet [name of product] Fumigant BUFFER ZONE"
- Contact information for the supervising fumigant handler in charge of the fumigation

The warning signs for the **treated area** must:

- Remain posted for no less than the duration of the re-entry interval after treatment.
- Be removed within 3 days after the end of the re-entry interval

The warning signs for the **treated area** must bear the following:

- Skull and crossbones symbol
- "DANGER"
- "Area under fumigation, DO NOT ENTER,"
- "Dazomet [name of product] Fumigant in USE,"
- Date and time of fumigation
- Date and time entry prohibition is lifted
- Brand name of this product
- Name, address, and telephone number of the supervising fumigant handler in charge of the fumigation

Emergency Preparedness and Response

If any of the following conditions apply the supervising fumigant handler must either follow the directions for **"Fumigant Site Monitoring"** or follow the directions for **"Response Information for Neighbours"**.

- Buffer zone is greater than **10 metres** and less than or equal to **30 metres**, and there are residences and businesses within **15 metres** from the edge of the buffer zone; or,
- Buffer zone is greater than **30 metres** and less than or equal to **60 metres**, and there are residences and businesses within **30 metres** from the edge of the buffer zone; or,
- Buffer zone is greater than **60 metres** and less than or equal to **90 metres**, and there are residences and businesses within **60 metres** from the edge of the buffer zone; or,
- Buffer zone is greater than **90 metres** or the **buffer zones overlap**, and there are residences and businesses within **90 metres from the** edge of the buffer zone.

If the buffer zone is **10 metres** then the Emergency Preparedness and Response requirements are not applicable.

Fumigation Site Monitoring

From the beginning of the fumigant application until the re-entry interval expires, a supervising fumigant handler or someone under his/her supervision must monitor the air concentration levels of the fumigant in the area between the buffer zone perimeter and the areas (such as residences or businesses) that trigger this requirement.

Monitoring the air concentration levels must begin in the evening on the day of application and continue until the re-entry interval expires with a minimum of at least 8 samples during the re-entry interval, including these periods:

- Once, 1 hour before sunset,
- Once, during the night,
- Once, at 1 hour after sunrise, and
- Once, during the day.

If at any time the person monitoring the air concentrations experiences sensory irritation, then the emergency response plan stated in the Fumigation Management Plan must be immediately implemented.

If other problems occur, such as a tarp coming loose, then the appropriate control plan must be activated.

The location and results of the air monitoring must be recorded in the post-application summary report.

Response Information for Neighbours
The supervising fumigant handler (or someone under his/her supervision) must ensure that residences and owners/operators of businesses that meet the criteria have been provided the emergency response information at least **1 week** before fumigation occurs.

Information that must be included:

- The general location of the application block.
- The fumigant(s) applied including the active ingredient, name of the fumigant product(s), and the Product Registration Number.
- Contact information for the supervising fumigant handler and property owner/operator.
- Time period in which the fumigation is planned to take place (must not range more than 4 weeks).
- Early signs and symptoms of exposure to the fumigant(s) applied, what to do and who to call if you believe you are being exposed (911 in most cases).
- How to find additional information about fumigants.
- The method used to share the response information for neighbours must be described in the Fumigation Management Plan and may be accomplished through mail, door hangers, or through other methods that will effectively inform people in residences and businesses within the required distance from the edge of the buffer zone.

11. Label amendments pertaining to the protection of the environment

For all antimicrobial uses:

Add to DIRECTIONS FOR USE:

> DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters.

For all soil fumigant uses:

Add to DIRECTIONS FOR USE:

> As this product is not registered for the control of pests in aquatic systems, DO NOT use to control aquatic pests. DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

DO NOT apply within 0.9-1.2 metres of growing plants or closer than the drop line of trees and large shrubs.

DO NOT apply this product if ambient air temperature exceeds 39°C.

DO NOT store this product in an open spreader overnight.

Add to ENVIRONMENTAL HAZARD:

Toxic to aquatic organisms.

To reduce runoff from treated areas into aquatic habitats avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Avoid application when heavy rain is forecast.

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative strip between the treated area and the edge of the water body.

The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (for example, sandy soil) and/or the depth to the water table is shallow.

For the greenhouse uses of the soil fumigant products:

Add to DIRECTIONS FOR USE:

DO NOT allow effluent or runoff from greenhouses containing this product to enter lakes, streams, ponds or other waters.

Appendix III The Minimum Requirements for Fumigation Management Plan

Each site-specific Fumigation Management Plan must contain the following elements:

1) Applicator information (name, phone number, license number, employer name, employer address, date of completing the appropriate provincial/territorial pesticide applicator certification program.

2) General site information:
   - Application block location, address or global positioning system (GPS) coordinates.
   - Name, address, and phone number of owner/operator of the application block.
   - Map, aerial photo, or detailed sketch showing field location, dimensions, buffer zones, property lines, roads, rights-of-ways, sidewalks, permanent walking paths, bus stops, water bodies, wells, nearby application blocks, surrounding structures (occupied and non-occupied), locations of posted signs for buffers, and sites requiring 200-metre to 400-metre buffer zones (e.g., schools, day care establishments, nursing homes, assisted living facilities, hospitals, in-patient clinics, and prisons) with distances from the application site labelled.

3) General application information:
   - Target application date/window
   - Brand name of fumigant
   - Product Registration Number

4) Tarp information and procedures for repair, perforation, and removal (if tarps are used):
   - Brand name, lot number, thickness
   - Name and phone number of person responsible for repairing tarps
   - Schedule for checking tarps for damage, tears, and other problems
   - Maximum time following notification of damage that the person(s) responsible for tarp repair will respond
   - Minimum time following application that tarp will be repaired
   - Minimum size of damage that will be repaired
   - Other factors used to determine when tarp repair will be conducted
   - Name and phone number of person responsible for cutting and/or removing tarps
   - Equipment/methods used to cut tarps
   - Schedule and target dates for cutting tarps
   - Schedule and target dates for removing tarps

5) Soil Conditions:
   - Description of soil texture in application block
   - Method used to determine soil moisture

6) Weather Conditions:
   - Summary of forecasted conditions for the day of the application and the 48 hour period following the fumigant application
   - Wind speed
   - Inversion conditions (e.g., shallow, compressed (low-level) temperature inversion)
   - Air stagnation advisory

7) Buffer zones:
   - Application method
   - Application rate from look-up table on label (kilogram active ingredient per hectare)
   - Application block size from look-up table on label (hectares)
   - Credits applied
   - Buffer zone distance
   - Description of areas in the buffer zone that are not under the control of the owner/operator of the application block.

8) Respirators and other personal protective equipment (PPE) for handlers (handler task, protective clothing, respirator type, respirator cartridge type, respirator cartridge replacement schedule, eye protection, gloves and other PPE).

9) Emergency procedures:
   - Evacuation routes
   - Locations of telephones
   - Contact information for first responders
   - Local/provincial/territorial/federal contacts
   - Key personnel
   - Emergency procedures/responsibilities in case of an incident, equipment/tarp/seal failure, complaints or elevated air concentration levels outside buffer zone suggesting potential problems, or other emergencies.

10) Posting requirements (names of persons who will post signs, location of posting signs and procedures for posting and sign removal).

11) Emergency Preparedness and Response (if applicable)
   - Fumigant site monitoring
     - Description of who, when, where, and procedures for monitoring buffer zone perimeter
   - Response information from neighbours
     - List of residences, businesses, and neighbouring property owners informed
     - Name and phone number of person doing notification
     - Method of providing information

12) Description on how the communication will take place between applicator, land owner/operator, and other on-site handlers (tarp cutters/removers, irrigators, etc.) for complying with label requirements (e.g., buffer zone location, buffer zone start/stop times, timing of tarp perforation and removal, personal protective equipment); including the name and phone number of persons contacted and the date contacted.

13) Federal, provincial, territorial and local notification.

14) Authorized on-site personnel:
- Names, addresses and phone numbers of all handlers
- Employer name, address, and phone numbers for all handlers
- Tasks that each handler is authorized and trained to perform
- Date of training for each handler

15) Air monitoring:
- For buffer zone monitoring: (if applicable)
  - Name, address, and, phone number of handler to perform monitoring activities
  - Location and timing of monitoring for the buffer zone
- For handlers without respiratory protection:
  - If sensory irritation is experienced, indicate whether operations will be ceased or operations will continue with respiratory protection
  - If intended to cease operations when sensory irritation is experienced, provide the name, address, and phone number of the handler that will perform monitoring activities prior to operations resuming.
- For handlers with respiratory protection:
  - Representative handler tasks to be monitored
  - Monitoring equipment to be used and timing of monitoring

16) Good Agricultural Practices (GAPs):
- Description of applicable mandatory GAPs (registrants may also include optional GAPs)
- Measurements and other documentation planned to ensure GAPs are achieved (e.g., measurement of soil and other site conditions)

17) Description of hazard communication
- The buffer zone around the application block has been posted in accordance with the label.
- Pesticide product labels and material safety data sheets are on-site and readily available for employees to review.

18) Record keeping procedures:
- The owner/operator of the application block as well as the supervising fumigant handler must keep a signed copy of the site-specific Fumigation Management Plan and the post application summary for 2 years from the date of application.

19) Post-application Summary Report:

Date of the application, application rate, and size of application block fumigated

Summary of weather conditions on the day of the application and during the 48-hour period following the fumigant application

Soil temperature measurement (if air temperatures were above 38 degrees Celsius in any of the 3 days prior to the application)

Tarp damage and repair information (if applicable)

- Location and size of tarp damage
- Description of tarp/tarp seal/tarp equipment failure
- Date and time of tarp repair

Tarp perforation/removal details (if applicable)

- Description of tarp removal (if different than in the Fumigation Management Plan)
- Date tarps were perforated
- Date tarps were removed

Complaint details (if applicable)

- Person filing complaint (e.g., on-site handler, person off-site)
- If off-site person - name, address, and phone number of person filing complaint
- Description of control measures or emergency procedures followed after complaint

Description of incidents, equipment failure, or other emergency and emergency procedures followed (if applicable)

Details of elevated air concentrations monitored on-site (if applicable)

- Location of elevated air concentration levels
- Description of control measures or emergency procedures followed

Air monitoring results

- When sensory irritation experienced:
    - Date and time of sensory irritation
    - Handler task/activity
    - Handler location where irritation was observed
    - Resulting action (e.g., cease operations, continue operations with respiratory protection)

- When using a direct read instrument:
  - Sample date and time
  - Handler task/activity
  - Handler location
  - Air concentration
  - Sampling method

Date of buffer zone sign removal

Any deviations from the Fumigation Management Plan